

## PATENT COOPERATION TREATY

PCT

**NOTIFICATION CONCERNING  
THE FILING OF AMENDMENTS OF THE CLAIMS**  
(PCT Administrative Instructions, Section 417)

From the INTERNATIONAL BUREAU

To:

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Date of mailing (day/month/year)  05 October 2005 (05.10.2005)	
Applicant's or agent's file reference  05-8058-SNY	<b>IMPORTANT NOTIFICATION</b>
International application No.  PCT/JP2005/010928	International filing date (day/month/year)  15 June 2005 (15.06.2005)
<b>Applicant</b>  SONY CORPORATION et al	

1. The applicant is hereby notified that amendments to the claims under Article 19 were received by the International Bureau on:

26 September 2005 (26.09.2005)

2. This date is within the time limit under Rule 46.1.

Consequently, the international publication of the international application will contain the amended claims according to Rule 48.2(f), (h) and (i).

3. The applicant is reminded that the international application (description, claims and drawings) may be amended during the international preliminary examination under Chapter II, according to Article 34, and in any case, before each of the designated Offices, according to Article 28 and Rule 52, or before each of the elected Offices, according to Article 41 and Rule 78.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland  Facsimile No. (41-22) 338.90.90	Authorised officer  Fabienne LAMPIIS (Fax 338 9090) Telephone No. (41-22) 338 9506
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26/09/2005

World Intellectual Property Organization  
PCT Division  
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COPY

Amendment of the claims under Article 19(1) (Rule 46)

International Application No.: PCT/JP2005/010928

International Filing Date: 15/06/2005

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Agent's File reference: 05-8058-SNY

Dear Sirs:

The applicant, who received the International Search Report relating to the above-identified International Application transmitted on July 26, 2005 hereby files an amendment under Article 19(1) as in the attached sheets.

In the amendment, claims 1 and 15 to 27 are amended, and claims 13, 14, 28, and 29 are added.

The applicant also files as attached herewith a brief

statement explaining the amendment and indicating any impact that amendment therein might have on the description and drawings.

Very truly yours,

Takahisa Satoh

Takahisa SATOH

Attachment:

(1) Amendment under Article 19(1)	6 sheets
(2) Brief Statement	1 sheet

## 1. (Amended)

A semiconductor light emitting device, comprising:

a substrate;

a first conductive type first cladding layer formed

5 on said substrate;

an active layer formed on said first cladding

layer; and

a second conductive type second cladding layer

formed on said active layer, a part thereof having a

10 ridge-shaped portion as a current narrowing structure;

wherein said ridge-shaped portion of said second

cladding layer includes a first ridge-shaped layer on the

side close to said active layer and a second ridge-shaped

layer on the side distant from the active layer; and

15 bandgaps of said first cladding layer and said

second ridge-shaped layer have a profile lower than

bandgaps of a portion excepting said ridge-shaped portion

of said second cladding layer and said first ridge-shaped

layer.

20 2. A semiconductor light emitting device as set forth

in claim 1, wherein said first ridge-shaped layer and

said second ridge-shaped layer are a layer with a high

aluminum composition ratio and a layer with a low

aluminum composition ratio, respectively.

25 3. A semiconductor light emitting device as set forth

in claim 2, wherein

an aluminum composition ratio X1 of said first ridge-shaped layer is  $0.60 \leq X1 \leq 0.70$ , and

5 an aluminum composition ratio X2 of said second ridge-shaped layer is  $X2 \leq X1$ .

4. A semiconductor light emitting device as set forth in claim 2, wherein

an aluminum composition ratio X1 of said first ridge-shaped layer is 0.70, and

10 an aluminum composition ratio X2 of said second ridge-shaped layer is 0.65.

5. A semiconductor light emitting device as set forth in claim 1, wherein a film thickness of said first ridge-shaped layer is 50 to 400 nm.

15 6. A semiconductor light emitting device as set forth in claim 1, wherein a sum of a film thickness of a portion excepting said ridge-shaped portion of said second cladding layer and a film thickness of said first ridge-shaped layer is 750 nm or smaller.

20 7. A semiconductor light emitting device as set forth in claim 1, wherein an etching stop layer is formed on a boundary face of a portion excepting the ridge-shaped portion of said second cladding layer and said first ridge-shaped layer.

25 8. A semiconductor light emitting device as set forth

in claim 1, wherein said first cladding layer, said active layer and said second cladding layer are formed by an AlGaInP-based material.

9. A semiconductor light emitting device as set forth  
5 in claim 1, wherein said first cladding layer, said active layer and said second cladding layer are formed by an AlGaN-based material.

10. A semiconductor light emitting device as set forth  
in claim 1, wherein said first ridge-shaped layer is  
formed by a layer having an equal refractive index to  
that of a portion excepting said ridge-shaped portion of  
said second cladding layer.

11. A semiconductor light emitting device as set forth  
in claim 1, wherein said first ridge-shaped layer is  
15 formed by a layer having a lower refractive index than  
that of a portion excepting said ridge-shaped portion of  
said second cladding layer.

12. A semiconductor light emitting device as set forth  
in claim 11, wherein an aluminum composition ratio of a  
20 portion excepting said ridge-shaped portion of said  
second cladding layer is 0.68, and

an aluminum composition ratio of said first ridge-  
shaped layer is 0.75 to 0.80.

13. (Added)

25 A semiconductor light emitting device, comprising:

a substrate;

a first conductive type first cladding layer formed on said substrate;

an active layer formed on said first cladding

5 layer; and

a second conductive type second cladding layer formed on said active layer, a part thereof having a ridge-shaped portion as a current narrowing structure;

wherein said ridge-shaped portion of said second

10 cladding layer includes a first ridge-shaped layer on the side close to said active layer and a second ridge-shaped layer on the side distant from the active layer;

a bandgap of said second ridge-shaped layer has a profile lower than bandgaps of a portion excepting said

15 ridge-shaped portion of said second cladding layer and said first ridge-shaped layer; and

an etching stop layer is formed on a boundary face of said portion excepting said ridge-shaped portion of said second cladding layer and said first ridge-shaped

20 layer.

14. (Added)

A semiconductor light emitting device, comprising:

a substrate;

a first conductive type first cladding layer formed

25 on said substrate;

an active layer formed on said first cladding  
layer; and

a second conductive type second cladding layer  
formed on said active layer, a part thereof having a  
5 ridge-shaped portion as a current narrowing structure;

wherein said ridge-shaped portion of said second  
cladding layer includes a first ridge-shaped layer on the  
side close to said active layer and a second ridge-shaped  
layer on the side distant from the active layer;

10 a bandgap of said second ridge-shaped layer has a  
profile lower than bandgaps of a portion excepting said  
ridge-shaped portion of said second cladding layer and  
said first ridge-shaped layer; and

said first cladding layer, said active layer and  
15 said second cladding layer are formed by an AlGaInP-based  
material.

15. (Amended)

A method of producing a semiconductor light  
emitting device, including:

20 a step of forming at least a first conductive type  
first cladding layer, an active layer and a second  
conductive type second cladding layer by stacking on a  
substrate by an epitaxial growth method; and

a step of processing a ridge-shaped portion as a  
25 current narrowing structure at a part of said second

cladding layer;

wherein, in the step of forming said second cladding layer, a portion to be said ridge-shaped portion is formed to include a first ridge-shaped layer on the 5 side close to said active layer and a second ridge-shaped layer on the side distant from the active layer; and

in the step of forming said first cladding layer and the step of forming said second cladding layer, they are formed to obtain that bandgaps of said first cladding 10 layer and said second ridge-shaped layer have a profile lower than bandgaps of a portion excepting said ridge-shaped portion of said second cladding layer and said first ridge-shaped layer.

16. (Amended)

15 A method of producing a semiconductor light emitting device as set forth in claim 15, wherein in the step of forming said second cladding layer, a layer having a high aluminum composition ratio and a layer having a low aluminum composition ratio are formed 20 as said first ridge-shaped layer and said second ridge-shaped layer, respectively.

17. (Amended)

A method of producing a semiconductor light emitting device as set forth in claim 16, wherein 25 in the step of forming said second cladding layer,

a layer having an aluminum composition ratio X1 satisfying  $0.60 \leq X1 \leq 0.70$  is formed as said first ridge-shaped layer and a layer having an aluminum composition ratio X2 of  $X2 \leq X1$  as said second ridge-shaped layer.

5 18. (Amended)

A method of producing a semiconductor light emitting device as set forth in claim 16, wherein in the step of forming said second cladding layer, 10 a layer having an aluminum composition ratio X1 of 0.70 is formed as said first ridge-shaped layer and a layer having an aluminum composition ratio X2 of 0.65 is formed as said second ridge-shaped layer.

19. (Amended)

15 A method of producing a semiconductor light emitting device as set forth in claim 15, wherein in the step of forming said second cladding layer, said first ridge-shaped layer is formed to have a film thickness of 50 to 400 nm.

20 20. (Amended)

A method of producing a semiconductor light emitting device as set forth in claim 15, wherein in the step of forming said second cladding layer, a sum of a film thickness of a portion excepting said 25 ridge-shaped portion of said second cladding layer and a

film thickness of said first ridge-shaped layer is made to be 750 nm or smaller.

21. (Amended)

A method of producing a semiconductor light emitting device as set forth in claim 15, wherein the step of forming said second cladding layer includes a step of forming an etching stop layer on a boundary face of a portion excepting said ridge-shaped portion of said second cladding layer and said first ridge-shaped layer.

22. (Amended)

A method of producing a semiconductor light emitting device as set forth in claim 21, wherein in the step of processing said ridge-shaped portion 15 as the current narrowing structure at the part of said second cladding layer, the part of said second cladding layer is processed to be said ridge-shaped portion by etching which stops at said etching stop layer.

23. (Amended)

20 A method of producing a semiconductor light emitting device as set forth in claim 15, wherein said first cladding layer, said active layer and said second cladding layer are formed by an AlGaInP-based material.

24. (Amended)

25 A method of producing a semiconductor light

emitting device as set forth in claim 15, wherein said first cladding layer, said active layer and said second cladding layer are formed by an AlGaN-based material.

25. (Amended)

5 A method of producing a semiconductor light emitting device as set forth in claim 15, wherein in the step of forming said second cladding layer, a layer having a same refractive index as that of a portion excepting said ridge-shaped portion of said 10 second cladding layer is formed as said first ridge-shaped layer.

26. (Amended)

A method of producing a semiconductor light emitting device as set forth in claim 15, wherein 15 in the step of forming said second cladding layer, a layer having a lower refractive index than that of a portion excepting said ridge-shaped portion of said second cladding layer is formed as said first ridge-shaped layer.

20 27. (Amended)

A method of producing a semiconductor light emitting device as set forth in claim 26, wherein in the step of forming said second cladding layer, a layer having an aluminum composition ratio of 0.68 is 25 formed as a portion excepting said ridge-shaped portion

of said second cladding layer and a layer having an aluminum composition ratio of 0.75 to 0.80 is formed as said first ridge-shaped layer.

28. (Added)

5 A method of producing a semiconductor light emitting device, including:

a step of forming at least a first conductive type first cladding layer, an active layer and a second conductive type second cladding layer by stacking on a 10 substrate by an epitaxial growth method; and

a step of processing a ridge-shaped portion as a current narrowing structure at a part of said second cladding layer;

wherein, in the step of forming said second 15 cladding layer, a portion to be said ridge-shaped portion is formed to include a first ridge-shaped layer on the side close to said active layer and a second ridge-shaped layer on the side distant from the active layer, and the second cladding layer is formed to obtain that a bandgap 20 of said second ridge-shaped layer has a profile lower than bandgaps of a portion excepting said ridge-shaped portion of said second cladding layer and said first ridge-shaped layer; and

the step of forming said second cladding layer 25 includes a step of forming an etching stop layer on a

boundary face of said portion excepting said ridge-shaped portion of said second cladding layer and said first ridge-shaped layer.

29. (Added)

5 A method of producing a semiconductor light emitting device, including:

a step of forming at least a first conductive type first cladding layer, an active layer and a second conductive type second cladding layer by stacking on a 10 substrate by an epitaxial growth method; and

a step of processing a ridge-shaped portion as a current narrowing structure at a part of said second cladding layer;

wherein, in the step of forming said second 15 cladding layer, a portion to be said ridge-shaped portion is formed to include a first ridge-shaped layer on the side close to said active layer and a second ridge-shaped layer on the side distant from the active layer, and the second cladding layer is formed to obtain that a bandgap 20 of said second ridge-shaped layer has a profile lower than bandgaps of a portion excepting said ridge-shaped portion of said second cladding layer and said first ridge-shaped layer; and

said first cladding layer, said active layer and 25 said second cladding layer are formed by an AlGaInP-based

**material.**